Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

GARDEN WORK IN THE FIFTH GRADE OF THE UNIVERSITY ELEMENTARY SCHOOL.

MARY M. STEAGALL.

In the spring the garden became the center of organization of the science work. The feeling that the sap was again rising in the veins of all nature gave rise to an innate longing to help nature into activity and beauty again, the desire to plant seeds and to watch their growth.

In early April the garden plot was surveyed by the seventh-grade children. The portion allotted to the fifth grade was a rectangle fifty feet east and west by fifteen north and south. With tape and rule the children verified the measurements of the seventh grade and began to plan the work. Many problems confronted them. As it was still too cool to begin the outdoor work, they devoted themselves to solving some of them in the laboratory.

The garden was selected on an untried area. Was the soil rich, or would it need fertilizing? Of what was it composed? The first question was practically answered by taking some of the soil into the house and testing the growth of plants in it with the growth of similar plants in rich and in poor soils.

The children did not know what made the soil rich or poor, did not know the soil constituents. They could see the stones, gravel, and sand. They were anxious to test it for carbonate of lime, but did not know how it was made nor what the real body of it was. They suggested a coarse sieve for the pebbles and stones, and a finer one for the gravelly sand. They could see the sand that would pass through their fine sieve, but did not know how to separate it from the "dirt," as they called the clay.

They decided to take a kilogram of soil and separate it into as many parts as possible, and find the part that each made of the whole. This amount furnished groups of two or three with about 200 grams each with which to work. After separating the stones and gravel, they boiled the remainder about twenty minutes; then by a gentle stream of water floated away the clay leaving the sand. The water in which the clay floated was kept, allowed to settle, and drained. The parts dried were put together and weighed. The weights furnished practice in comparison of numbers. The process gave individual work, but at the same time furnished one result so that class work might be done in the calculation.

The attempt to grow plants in these constituents taken separately, and to compare the results, failed through lack of that continual vigilance necessary to success in all experimental work.

The garden itself was then planned on paper. A plat of it was made to a scale one-eighth inch to the foot. Each child was allowed to plan the walks and the planting according to his best judgment, and from these was to be selected an approved plan. This involved both an ethical and a practical question. Utility required a walk all around the plat. Two groups of children necessitated equal divisions with similar conditions of light, soil, etc. The ethical required that the part should be planned in reference to the whole. The shade was on the east and south, but more particularly from the east. To divide it from west to east would give almost equal physical conditions, but separate the whole into two long narrow portions, and so sacrifice the pleasing shape. To divide it north and south would give beauty of form at the expense of equal conditions of sunlight. The children chose to subordinate their desire for equal rights to the pleasing whole. This proved, too, a real sacrifice to one group, as the western portion far excelled the eastern in rapidity of growth and rankness of production.

Further divisions must depend on the seeds planted. What to plant was determined by two conditions: the season and length of time during which we might have access to the garden, and the interest of the children in geography and history. The seasons were to be spring and fall. So for the spring harvest lettuce, radishes, and onions were chosen. Their interest in the Puritan Thanksgiving led them to choose corn and pumpkins for fall harvesting. They wished to plant cotton, tobacco, and rice, but the time was too short for these.

The kind of seeds then conditioned the garden arrangement. There was a desire for individual ownership and individual responsibility in each group, yet twenty-five or thirty separate portions would spoil the beauty of the whole. Here the ethical conflicted with the principle of individual ownership, and a happy agreement was reached in which the center was chosen (Fig. 1, *a*) for corn and pumpkins, leaving a one and one-half foot border for the earlier crop. The latter could lend itself to individual ownership and responsibility by merely stretching strings for boundaries.

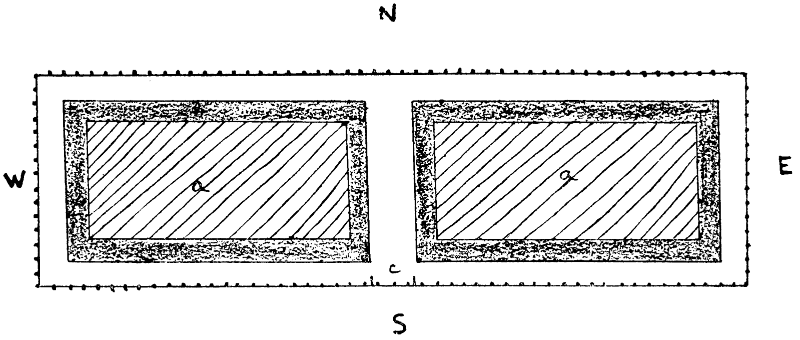

FIG. 1.

The actual measurement and division of the garden furnished the basis for a study of square measurement which was followed up in the Arithmetic work.

The staking off of a two-foot walk around the whole was an easy problem. The separation of the remainder into two equal parts by a three-foot walk was not difficult. The border was easily staked off, but the separation of this into equal portions for individual work was difficult. It was a long while before the children discovered that they must not count the corners twice.

When they knew what they were to plant, the conditions for germination and growth furnished the next problems. They began to think by this time that their soil was good. The amount of water necessary was not made the subject of a quantitative experiment, but by watering the window plants from day to day they learned to tell by the look of plant and soil when more moisture was needed.

That moisture was required for germination was not questioned, but how it made its way into the seed was an interesting problem. They worked this out by covering with paraffin the various parts of the seed and soaking to see what covering prevented the water's getting in.

The amount of sunlight and its effect were studied by planting two window boxes with like seeds under similar conditions, except that one box was kept in a north and the other in a south window. These were carefully watched, the difference in temperature of the two taken, and notes made from day to day of the differences in time of germination and growth. Colored sketches were made to show differences in color at sprouting, and again after exposure to light for about seven days.

Next the children investigated the depth at which the seeds should be planted. They first put the seeds into flower-pots, but such poor results were obtained, because of the unequal conditions in various cases, that window boxes were thought better. A part of manual-training time was given to making three or four boxes large enough to just fit the ledge, and deep enough to allow a four-inch planting. In these, seeds were planted at depths of one, two, three, and four inches. Careful notes were made of the depths, of the seeds which first germinated, and of those which had the better hold in the soil after growth began. They noted, too, that seeds planted an inch below the surface are likely before germination to become exposed on account of winds or beating rains.

The strength of the seedling for making its way out of the soil was questioned in some of the greater depths; so, to get an idea of its strength, we took a jar half full of peas and put them under germinating conditions. After a week they were found to fill the jar, pressing so tightly against each other as to make them irregular hexagons instead of spheres. They were packed in so closely that it was impossible to remove them except one at a time, and even then they must be cut to pieces first.

The raking, spading, measuring, and planting gave abundant outdoor exercise for weeks. For this work rakes and spades were provided in the following manner: Good oak lumber was provided in the manual-training room. Round handles were made about a yard long. For the rake (Fig. 2) a piece of lumber 1½ × 1 × 12 inches was taken. A hole was bored through the one-inch way for the inserting of the handle. Spike nails were then driven through the one-half inch way at distances of one inch apart, the middle one going through the handle and fastening it. The spade was made to correspond to Fig. 3. The broad part of this was about 9 × 6½ inches. It was made strong near the handle by a cross-piece 1 × 1 × 6½ inches which was fastened to it by bolts. The handle was given a slope by a diagonal sawing. It was bolted to the broad part, and passed through a groove in the stay to which it was bolted. Rakes so made are quite satisfactory. The spades are serviceable for the lighter work, if one or two iron spades are used in the tougher soil.

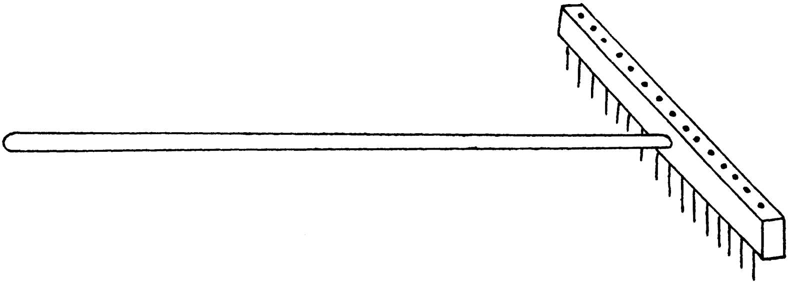

FIG. 2

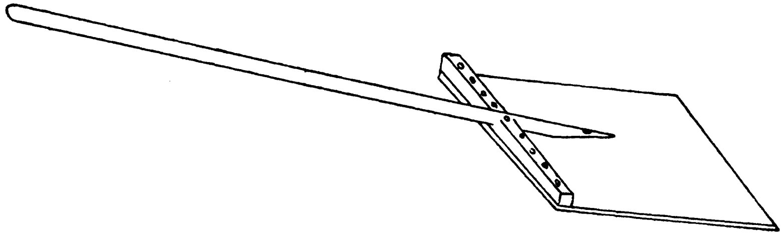

FIG. 3.

After the seeds had been planted, areas two feet square were staked off on a vacant lot not far away. Here the germination of the weeds of the district was studied. The children discovered how many different kinds grew on the area and made an estimate of the number of each kind. In this way they learned to recognize the form and to know the names of the common weeds of the locality; so when the time for weeding arrived, they knew the weeds that were to be plucked out, and no mistakes were made by pulling up the seedlings.

The question arose as to which was better to plant, onion sets or onion seeds. One group planted the seeds, and the other the sets, with the result that the latter harvested its onions this spring, while the former will have a harvest in the autumn.

This account of the meager work in connection with the fifth-grade garden is illustrative of the fundamental importance and far-reaching consequences of intelligent garden work. It is in its nature physical, social, moral, ethical, extensive, and experimental. It is physical in that it gives motor response to the idea and gives the child an opportunity for being out of doors a while each day. It is fundamentally social, as no part of the school work can bring the children into freer and more commonsense relations socially. The garden party to which they invited their parents and friends gave them a chance to realize themselves as a functioning part of the social whole. It is moral in that it develops the ideas of respect for property, ownership, responsibility, and dignifies manual labor. It establishes the fundamental percepts of ethical ideas and in its principles extends to all the subjects of the curriculum. Here may be worked out not alone the fundamental principles of the natural and physical sciences, but it is the basis for mathematics, history, geography, drawing, and literature. Through its inductive experimentation it enlarges the imagery and establishes the basis of logical thinking.

MARCH OF THE LITTLE SANDALS.

MAY ROOT KERN.